centres of these Mollusca and the cerebro-spinal system of the Vertebrata, and accordingly they find there is a strict analogy between them, even to the individual pairs of ganglia of which they respectively consist, the general result being that the whole of the ganglia, grouped around the œsophagus in these Mollusca, answers to the encephalon, and a small portion of the enrachidion, of the Vertebrata.

Organs of the Senses.—The auditory capsules are microscopic, composed of two concentric vesicles, the inner enclosing numerous, oval, nucleated otolithes. *The eyes* are minute black dots, beneath the skin, attached by a pedicle to a small ganglion. They are made up of a cup of pigment, receiving from behind the nerve, and lodging in front a lens, having in advance of it a cornea, the whole enclosed by a fine capsule. The authors believe they have shown the dorsal tentacles to be the *olfactory organs*.

The organs of touch are, the general surface of the skin, but more particularly the oral tentacles or veil. *Taste* is most probably located in the lips and channel of the mouth, the tongue being a prehensile organ, and ill-adapted as the seat of such a function.

In conclusion, the authors comment on the high organization of the *Doridæ,* and express their belief that the genus, as at present understood, will require to be broken up into several groups.

BOTANICAL SOCIETY OF EDINBURGH.

July 8, 1852.—Dr. Seller, President, in the Chair.

The following papers were read:—

1. "On the presence of Fluorine in the stems of Gramineæ, Equisetaceæ, and other Plants, with some observations on the sources from which vegetables derive this element," by George Wilson, M.D.

The author commenced by stating, that the earliest observer of the presence of fluorine in plants was Will of Giessen, who found traces of it in barley, the straw and grain of which were analysed together. The author reported to the Botanical Society, some four years ago, the results of his earlier researches into the distribution of this element throughout the vegetable kingdom, which were not very numerous or very encouraging. One reason of this was the small extent to which fluorine occurs in plants; another, and practically as serious a reason, was the difficulty of separating and recognising fluorine when accompanied by silica. The presence of this body in a plant, besides greatly complicating the investigation, rendered the employment of platina vessels essential, and thus limited the amount of material which could be subjected to examination, besides making it difficult or impossible to observe the progress of an analysis.

The author then stated, that, in the course of some recent investigations into the presence of fluorine in siliceous rocks, he had succeeded in devising a process which was also applicable to plants, and could be carried on in the ordinary glass vessels of the laboratory. The process in the case of plants was as follows:—The plant under examination was burned to ashes as completely as possible. The ashes were then mixed in the cold with oil of vitriol, so as to secure the decomposition of the salts of volatile acids present. The mixture was then transferred to a retort, or flask, provided with a bent tube dipping into water, and the liquid raised to the boiling-point, when fluorine, if present, was evolved in combination with the silicon of the silica, as the gaseous fluoride of silicon, which dissolved in the water with separation of some gelatinous silica. The resulting solution was neutralized with ammonia and evaporated to complete dryness, when the whole of the silicon passed into the condition of insoluble silica, and water dissolved the fluoride of ammonium. The solution of this fluoride could then be dried up and moistened with sulphuric acid, when hydrofluoric acid was evolved, which might be made permanently to record its presence by causing it to etch glass in the usual way. The author has in the meanwhile applied this process almost solely to the stems and trunks of plants, especially to those containing silica, reserving for subsequent investigation their other organs, especially their seeds and fruits. The following were the results obtained:—

Table of Plants examined for Fluorine. The numbers represent grains of ashes, except in the case of Tabasheer and Wood Opal. The blanks imply that the weight was not known:—

Ashes in grains.	Name of plant.	
200	*Equisetum limosum*	Distinct etching.
	Bambusa arundinacea	Ditto.
	Charcoal (derived chiefly from Oak, and to a smaller extent from Birch)	Ditto.
	Coal	Ditto.
	Barley straw	Ditto.
	Hay (Ryegrass)	Ditto.
35	*Equisetum variegatum*	Faint etching.
19	——— *hyemale*	Ditto.
255	——— *palustre*	Ditto.
	Dactylis cæspitosa	Ditto.
99	*Elymus arenarius*	Ditto.
495	*Saccharum officinarum*	Ditto.
1040	African Teak	Ditto.
	Smilax latifolia	No etching.
	Rosmarinus officinalis	Ditto.
235	*Bambusa Nepalensis*	Ditto.
	Polypodium vulgare	Ditto.
537	Tree Fern	Ditto.
24	*Phalaris arundinacea*	Ditto.
240	Malacca Cane	Ditto.
50	Cocoa-nut shell	Ditto.
127	*Tectona grandis*	Ditto.
80	Tabasheer	Ditto.
1680	Wood Opal	Ditto.

On this table the author remarked, that the siliceous stems which he had found to abound most in fluorine, were exactly those which contained most silica. In particular, deep etchings were procured from the Equisetaceæ and from the Gramineæ, especially the common Bamboo. The last was known to contain silica in such abundance that it collected within the joints in white masses, nearly pure, and had long, under the name of Tabasheer, been an object of interest to natural philosophers. The horse-tails were scarcely less remarkable for the amount of silica contained in their stems, which had led to the employment of one of them (*Equisetum hyemale*) in polishing wood and metals. The African Teak, which like the Bamboo is known sometimes to secrete silica, was also found to contain fluorine, though much less largely than the plants named; whilst the strongly siliceous stems of Barley and Ryegrass also yielded the element in marked quantity. The Sugar-cane, however, gave less striking results than might have been expected, and the same remark applied to the Malacca-cane. Two specimens of silicified wood and one of Tabasheer gave no evidence of the presence of fluorine. So far, however, as the plants named in the preceding table are concerned, the author does not wish it to be inferred from the negative results which are detailed, that the plants in question are totally devoid of fluorine. With larger quantities of their ashes, positive results would, in all probability, be obtained.

The author's general conclusions were as follows:—1st, that fluorine occurs in a large number of plants; 2nd, that it occurs in marked quantity in the siliceous stems of the Gramineæ and Equisetaceæ; 3rd, that the quantity present is in all cases very small; for although exact quantitative results were not obtained, it is well known that a fraction of a grain of fluoride will yield with oil of vitriol a quantity of hydrofluoric acid sufficient to etch glass deeply, so that the proportion of fluorine present, even in the plant-ashes which contain it most abundantly, does not probably amount to more than a fraction per cent. of their weight. The proportion of fluorine appears to be variable, for different specimens of the same plant did not yield concordant results.

In this, however, there is nothing anomalous, for some Bamboos yield *Tabasheer* largely, whilst others are found to contain none. It seems not unlikely that soluble fluorides ascending the siliceous stem of a plant, on their way to the seeds or fruits in which they finally accumulate, may be arrested by the silica, and converted into insoluble fluosilicates (fluorides of silicon and of a metal); and a Bamboo, for example, secreting Tabasheer, may effect this change where one less rich in silica cannot determine it. The slow or quick drying of a stem may also affect the fixation of fluorides in the stems or trunks of plants.

The sources of the fluorine found in plants may be regarded as preeminently two,—1st, simple fluorides, such as that of calcium, which are soluble in water, and through this medium are carried into the tissues of plants; and 2nd, compounds of fluorides with other salts, of which the most important is probably the combination of phosphate of lime with fluoride of calcium. This occurs in the mineral kingdom in apatite and phosphorite, and in the animal kingdom in bones, shells and corals, as well as in blood, milk, and other fluids.

A recent discovery of the author, communicated to the Royal Society of Edinburgh, has shown that fluorides are much more widely distributed than is generally imagined, and that the trap rocks near Edinburgh, and in the neighbourhood of the Clyde, as well as the granites of Aberdeenshire, and the ashes of coal, contain fluorides, so that the soils resulting from the disintegration of those rocks cannot fail to possess fluorides also. All plants accordingly may be expected to exhibit evidence of their presence in the following portions of their tissues or fluids :—

1. In the ascending sap, simple fluorides.

2. In the descending sap, in association with the albuminous vegetable principles, and in the seeds or fruits, in a similar state of association, fluorides along with phosphates.

3. In the stems, especially when siliceous and hardened, fluorides in combination with silica. The investigation is still in progress.

2. "On the presence of Iodine in various Plants, with some remarks on its general distribution," by Mr. Stevenson Macadam.

The present paper owes its origin to some observations lately made by M. Chatin of Paris, and communicated by him to the French Academy of Sciences.

Chatin is of opinion, that in the atmosphere, in rain-water, and in soils there is an appreciable amount of iodine ; that the quantity of this element present in one district differs from that in another ; and that the relative amount of iodine in any one locality determines to a great extent the presence or absence of certain diseases. For instance, in the district of country which he classifies under the general title of the "Paris zone," the quantity of iodine present in the atmosphere, in the rain-water, and in the soil is comparatively great, and to this he ascribes the absence of goitre and cretinism ; whereas in the zone corresponding to that of the "alpine valleys," the amount of iodine has diminished to one-tenth of that found in the "Paris zone," and to this scarcity of the element he attributes the prevalence of goitre and cretinism, which in that zone are endemic. Considering that the subject was one of great importance, more especially if the conclusions arrived at by Chatin (in reference to the functions fulfilled by iodine in preventing the occurrence of the diseases referred to) could be legitimately deduced from the experiments which he performed, the author has this summer undertaken a series of analyses in reference to the general distribution of iodine. Mr. Macadam's researches have as yet been mostly directed to the atmosphere and to rain-water, and he considered that a notice of the results obtained might be interesting to the Society, alike from the intimate connexion which exists between the plant and the atmosphere, and from the fact, that he has been led to seek, and to detect, the presence of iodine in a department of the vegetable kingdom in which it has not hitherto been observed.

Chatin has not published a detailed account of the processes adopted by him ; but from the manner in which he speaks of the good effects produced by the addition of potash to substances under examination, which, to use his words, "arrested the complete decomposition of the iodine compounds whilst the waters were evaporating," and by the addition of carbonate of potash and carbonate of soda, which "rendered the iodine present in soils much more easily extracted," the author was led to believe that the fixed alkalies had been largely employed by him. Accordingly, in the first experiments, the alkalies were used in their caustic condition, for the purpose of fixing any free iodine, and retaining any compound of iodine which might be encountered.

Mr. Macadam commenced with an examination of the atmosphere. By the arrangement he employed, the air was made to traverse,—1st, a tube containing slips of paper, which had been previously dipped in a solution of starch; and 2nd, a double-necked gas bottle, containing about 3 oz. of a dilute solution of caustic soda. A continuous stream of air was drawn through the arrangement for some hours. This experiment was conducted in the morning, and in the afternoon a stream of air was for several hours drawn through the same arrangement, caustic potash being substituted for the caustic soda. The starch-papers did not exhibit the slightest coloration, even when moistened with distilled water. The solutions of potash and soda, however, on being treated with starch and nitric acid, at once exhibited the rose colour characteristic of the presence of iodine in small quantity. So far the experiments seemed to lead to the desired conclusion; but when portions of the original alkaline solutions, which had not been subjected to a current of air, were carefully tested, it was found that iodine was present in them, in quantity to all appearance as great as it was in those portions which had been used in the experiments.

Wishing to trace back the iodine to its source, samples of the carbonate of potash, carbonate of soda and lime, which had been employed in the preparation of the caustic solutions, were analysed, and in all three iodine was present in perceptible quantity. Desirous of making certain that the reagents used in the investigations were as pure as other commercial substances of the same kind, various specimens were procured from different sources, and in every sample which was subjected to examination the presence of iodine was detected. So far then as the determination of iodine in the atmosphere is concerned, the experiments were of no value. The alkalies through which the air had been drawn undoubtedly contained iodine originally, and therefore no certain conclusion could be drawn as to the probability of their being more highly iodized by contact with the atmosphere. To the presence of iodine in *potashes*, or, to use words more strictly botanical, in the *ashes of forest timber*, further reference will be made in a subsequent part of this paper.

In the next experiment the alkalies were dispensed with, the air being drawn through—

1. A tube with slips of starched paper, kept somewhat damp.
2. A gas-bottle immersed in a freezing mixture; and
3. A gas-bottle containing a solution of nitrate of silver.

A continuous current was kept up for fully five hours, commencing at mid-day. At the conclusion of this experiment, the papers were not altered in the slightest degree; the gas-bottle (2) contained about a quarter of an ounce of liquid, and the nitrate of silver (3) had not been perceptibly changed. The condensed liquid was neutral to test-papers; a drop of starch was added to it, and subsequently nitrite of potash and hydrochloric acid, which together form a most delicate means of detecting iodine; the result was negative. The nitrate of silver solution was cautiously evaporated to one half-ounce; sulphuretted hydrogen added to precipitate the silver, and liberate as hydriodic acid any iodine which might be present; the liquid raised in temperature, carefully avoiding ebullition, and filtered. The filtrate, on the addition of starch, nitrite of potash and hydrochloric acid, did not exhibit the slightest trace of iodine. Mr. Macadam therefore concluded, that in the large volume of air which he had drawn through the arrangement, there had not been an appreciable amount of iodine.

The experiments as yet referred to were made at different heights on Arthur's Seat, and their negative results led to arrangements being made for a trial on a scale much more extensive. Through the kindness of the proprietor of Kinneil Iron Works, the author was enabled to proceed to Borrowstowness, and attach his apparatus to the receiver from which the air under great pressure is forced into the blast-furnaces. By means of a stop-cock fixed in the receiver and a long flexible tube, the air was conducted to the following arrangement:—

1. A wide tube containing slips of paper dipped in starch.

2. A condensing worm, surrounded by a freezing mixture and attached to a receiver.

3. A tall jar containing chips of pumice-stone and a few iron filings, with sufficient water to cover them.

4. A similar jar with pumice-stone, scrapings of clean lead and a solution of acetate of lead.

5. A condensing worm immersed in a freezing mixture and attached to a receiver.

The air, under a pressure of 3 lbs. on the square inch, was allowed to traverse the arrangement for fully four hours, when the apparatus was taken asunder, and the contents of the vessels being placed in stoppered bottles, the whole was brought to Edinburgh for examination. The slips of paper (1) were not sensibly altered in tint, and did not betray the slightest indications of even a rose colour when moistened with distilled water. The condensers (2 and 5) contained each a very small quantity of liquid, which, on being tested, did not show a trace of iodine. The small quantity of liquid in the condensers may be accounted for by the comparatively high temperature possessed by the air rushing through so quickly as it did. The contents of the jar (3) were thrown on a filter, and washed with cold water. To the filtrate was added half an ounce of a solution of carbonate of potash, and the whole evaporated to a quarter of an ounce; no iodine was present. The carbonate of potash used in this trial was prepared by calcining cream of tartar, and was so far free from iodine, that none could be detected in 2 oz. of the solution, of which half an ounce was employed. There was therefore no likelihood of iodine being added in the alkali used, even though the analysis of the contents of the jar had shown its presence. The jar (4) with the lead solution was treated in the same manner as described in a former part of this paper, when referring to the employment of silver, and the result was also negative. Notwithstanding the large scale on which this experiment was conducted, a volume of air of not less than 4000 cubic feet having been forced through the arrangement, Mr. Macadam has been unable to verify the results of Chatin, yet he feels disinclined to pronounce those results unwarranted, and has therefore resolved to make another trial on a still larger scale. It is proposed to fit up an apparatus of a stronger and more durable nature, and to allow a volume of air of not less than 100,000 cubic feet to pass through.

Whilst the experiments on the atmosphere were proceeding, Mr. Macadam was also examining large quantities of the rain-water which fell in Edinburgh for the last two months. For this purpose, he added to 3 gallons of the water some ounces of a solution of acetate of lead. On standing twenty-four hours, a precipitate had fallen to the bottom, from which the liquid was drawn off. The precipitate was treated as formerly described, and no iodine was detected. As the iodide of lead is slightly soluble in water, and as it might be present in the liquid which had been removed from the precipitate, the whole was evaporated to 1 oz., and afterwards tested for iodine, but none was present. A second experiment was tried with a similar volume of rain-water, viz. 3 gallons, substituting nitrate of silver for the acetate of lead; a precipitate was observed after standing for twenty-four hours, but neither it nor the liquid contained a trace of iodine. Another experiment, made with 3 gallons of rain-water, which had been collected at Unst in the Shetlands, and to which acetate of lead was added, gave the same negative results.

Mr. Macadam is well aware, that, consequent on the evaporation of water from the surface of the ocean, portions of the salts contained in it are carried up and disseminated through the atmosphere, ready to be rained down upon inland places, and that in this way iodine, most probably as iodide of sodium, will be present in the air. Accordingly at first he was confident that he should succeed in verifying Chatin's observations in a district so near the sea as that around Edinburgh, and more especially in the water obtained from Unst, which had fallen in the immediate vicinity of the ocean; but when we consider what a very small per-centage of iodine is present in the water of the ocean, many gallons being required to give even a faint indication, equal to that exhibited by $\frac{1}{500,000}$th of a grain of an alkaline iodide, and if, further, we suppose that when the water rises in vapour from the sea, it carries up the salts in the same proportions as they exist in sea-water, it is evident that it would be requisite to evaporate some hundred gallons of rain-water, before even a minute trace of iodine could be obtained.

At a former part of this paper reference was made to the presence of iodine in the potashes of commerce. The samples first tested were those usually to be purchased in Edinburgh, but subsequently genuine and authenticated specimens of both crude and refined potashes were procured from Glasgow. It is to Canada and the United States that we owe our supplies of these materials. As imported into this country, they are contaminated with many foreign ingredients, and amongst the rest the author has detected iodine. The most ready means for separating and recognising this substance is to heat a considerable quantity of the salt with a minimum of water. On cooling the solution, the greater portion of the carbonate of potash, as well as the impurities, falls to the bottom of the vessel, whilst the iodide of potassium remains dissolved in the water. When testing for the iodine in the potashes, this solution was evaporated to dryness, treated with alcohol, boiled and filtered. The filtrate, on being evaporated to dryness, left a residue, which on resolution in water acted distinctly with the starch-test for iodine.

The presence of this element in potashes leads the author to believe that iodine will be found more generally distributed in the vegetable kingdom than it has formerly been supposed to be. The potashes from the States and from Canada are principally the dried lixivium of the ashes of forest-trees; but whilst by much the greater portion is so, the parties in charge are not very scrupulous about what plants they employ, and occasionally everything which comes in the way, and which will burn, is added to the pile. It may therefore be objected to the statement, that forest-trees contain iodine, that the iodine found in the ashes may be derived from the succulent herbs and shrubs, and not from the trees themselves; but this objection will be at once removed when it is stated, that in the lixivium of charcoal the author has obtained very distinct traces of iodine. Now the charcoal sold and used in this country is principally oak, with a little birch, elm and ash.

The amount of iodine in forest-trees must be comparatively small. When experimenting with the potashes, one is apt to forget the small bulk into which a large quantity of timber falls when the organic matter is expelled, and the saline ingredients are alone left. So far as can be estimated from the present qualitative experiments, the relative quantity of iodine in forest-trees is much less than that in succulent plants growing in marshy places.

In conclusion, it was mentioned that the presence of iodine in some freshwater plants was now generally recognised, and that the author is at present engaged in testing the various plants growing in the lochs in the neighbourhood of Edinburgh. The method employed in their analysis is to dry the plants, and burn them cautiously; indeed the *burning* should be rather termed *charring*; the ashes are reduced to fine powder, digested in water and filtered; the clear liquid evaporated, and subsequently treated like the potashes. In every case the process used for the liberation of iodine is that suggested by Dr. Price, viz. nitrite of potash and hydrochloric acid; and in many cases where no indications of iodine could be obtained by the ordinary methods, good results were procured with Dr. Price's process.

In the following plants, hitherto not known to contain iodine, Mr. Macadam has detected that element:—

Myosotis palustris.	Duddingstone Loch.
Mentha sativa	Ditto.

Menyanthes trifoliata	Duddingstone Loch.
Equisetum limosum	Ditto.
Ranunculus aquatilis......	Dunsappie Loch.
Potamogeton densus	Ditto.
Chara vulgaris	Ditto.

The author has also confirmed the presence of iodine in the following plants, in which it had been previously found by other observers; the specimens, however, are from different localities:—

Iris pseud-acorus	Duddingstone.
Phragmites communis	Ditto.

And in the ashes of coal.

As having some connexion with the subject treated of, the author intimated that he had obtained distinct indications of the presence of bromine in the crude potashes. It is unfortunate that our tests for bromine are so much inferior in delicacy to those of iodine, that it is necessary to operate upon very large quantities before the tests are distinct. There is no doubt that from its presence in trees, it will be found in greater abundance in the more succulent plants; but the few trials yet made have been unsuccessful in determining its presence in any but the crude Canadian and American potashes.

The experiments (excepting those pursued in the open air) were conducted in the laboratory of Dr. George Wilson, to whom the author feels deeply indebted for the kind manner in which he has afforded him every assistance in his power during the whole course of the investigation.

3. Dr. Balfour read the following letter by Mr. Richard Fryer to Dr. Pappe of Cape Town, relative to a case of poisoning by the bulbs of *Homeria collina*, specimens of which were exhibited to the meeting:—

"On perusing your 'Flora Capensis Medica,' the circumstance stated at page 26 of the poisonous effects of the bulb of the 'Cape Tulip,' brought to my recollection a dreadful accident which occurred in Hantam, in this district, many years ago, and, as I was called upon at the time in a judicial way to examine some of the bodies and take evidence upon the causes of death, I can vouch for the accuracy of what I shall here relate. It appears that one of the shepherds of a farmer residing there, brought home in the evening a bundle of bulbs, which the Dutch call 'Mutjes'; that towards dusk these were put under the ashes to roast, and when the other servants assembled in the kitchen they were taken out and eaten amongst them; the party consisting of three hottentots, two women, and one male slave. About half an hour after they had partaken of them they were all seized with dreadful nausea, followed shortly afterwards by severe vomiting, and a speedy prostration of strength. The farmer being called, ascertained immediately, from some of the bulbs still unconsumed, that they had been eating the '*Homeria collina*,' of the yellow sort 'Wilde Dagga.' Sweet oil, milk, and everything thought good were immediately administered, but before midnight the three hottentots and one woman had died in excruciating agonies. The male slave recovered, but for a year afterwards he looked like a skeleton, and the surviving woman ascribed her safety to only having eaten one bulb."

MISCELLANEOUS.

Notice of the Occurrence, on the Durham Coast, of Diphyllidia lineata. By Albany Hancock, Esq.

In the early part of last year, the Rev. G. C. Abbes brought to me a small mollusk which he had obtained from the boats at Whitburn. On examination, this creature proved to be *Diphyllidia lineata*, a most interesting addition to the marine fauna, not only of the district, but of England. It has occurred only once before in the British seas; in September 1849, a single specimen having been dredged off Shetland by Mr. Barlee. These two, the only British examples, are much smaller than those obtained in the Mediterranean, and are more attenuated in form. Thinking, therefore, that our specimen might possibly be a distinct species, I was induced to examine its internal structure; and Mr. Alder having kindly supplied individuals of the true *D. lineata*, a strict comparison was instituted, which has resulted in determining that the two forms are identical.—*Trans. of Tyneside Naturalists' Field Club*, vol. ii. p. 128.

IRISH MOLLUSCA.

To the Editors of the Annals of Natural History.

Windsor Lodge, Monkstown, co. Dublin,
August 5, 1852.

Gentlemen,—The following Mollusca are the results of three days' dredging in Birterbuy Bay, co. Galway. The first day I was accompanied by my friend Dr. Battersby of Torquay, who being pressed for time had to return to Dublin sooner than he expected, leaving me to pursue the conchological research in that delightful locality.

July 21.—*Gastrochæna modiolina*; the scarcer variety found in cases composed of broken shells, &c.
Pandora obtusa.
Lyonsia norvegica.
Thracia pubescens; one valve.
Psammobia tellinella.
—— *vespertina.*
Cardium fasciatum.
—— *nodosum.*
Circe minima, of the most beautiful marking.
Lepton squamosum.
Arca tetragona.
Modiola tulipa.
Lima Loscombii.
Dentalium Tarentinum.
Chiton Asellus; very large.
Trochus Montagui.
Odostomia eulimoides.
Mangelia gracilis; dead.
—— *purpurea*; dead.
—— *striolata.*
—— *septangularis.*
Cylichna conulus.
—— *cylindracea*; dead.
—— *truncata*; dead.

July 22.—Some of the shells found on the 21st, as also *Thracia convexa*; dead.
Thracia pubescens.
Solen pellucidus.
Cardium pygmæum.
Lucina spinifera.
—— *flexuosa.*